(12) UK Patent (19) GB (11) 2 251 547 (13) B

(54) Title of Invention

An electric kettle

(51) INT CL[5]; **A47J 27/21 31/14**

(21) Application No
9125632.1

(22) Date of filing
02.12.1991

(30) Priority Data

(31) **9100138**

(32) **04.01.1991**

(33) **GB**

(43) Application published
15.07.1992

(45) Patent published
30.06.1993

(52) Domestic classification
(Edition L)
A4A APE APE1
U1S S1788

(56) Documents cited
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EP0357878 A
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(58) Field of search

As for published application 2251547 A *viz:*
UK CL(Edition K) **A4A AN APE AQ**
INT CL[5] **A47J**
Online database: WPI
updated as appropriate

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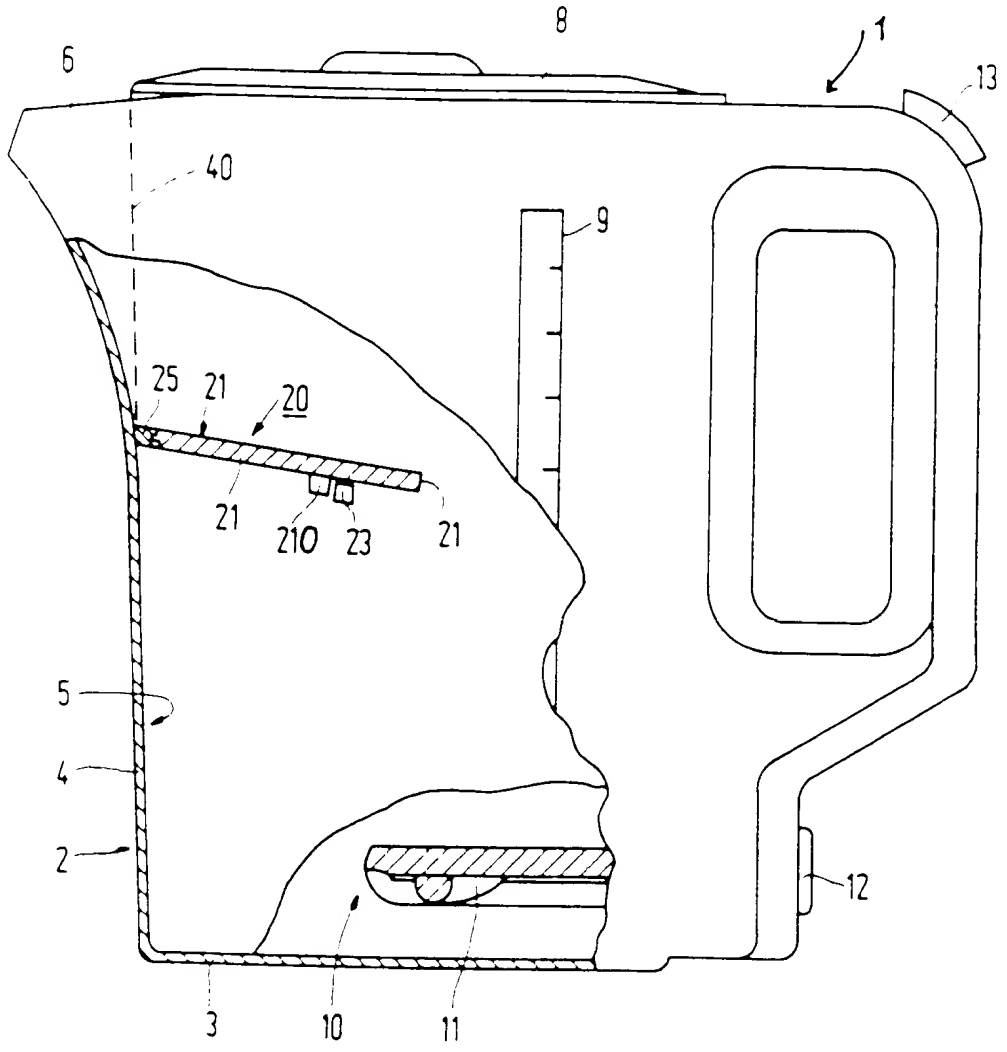

FIG.1

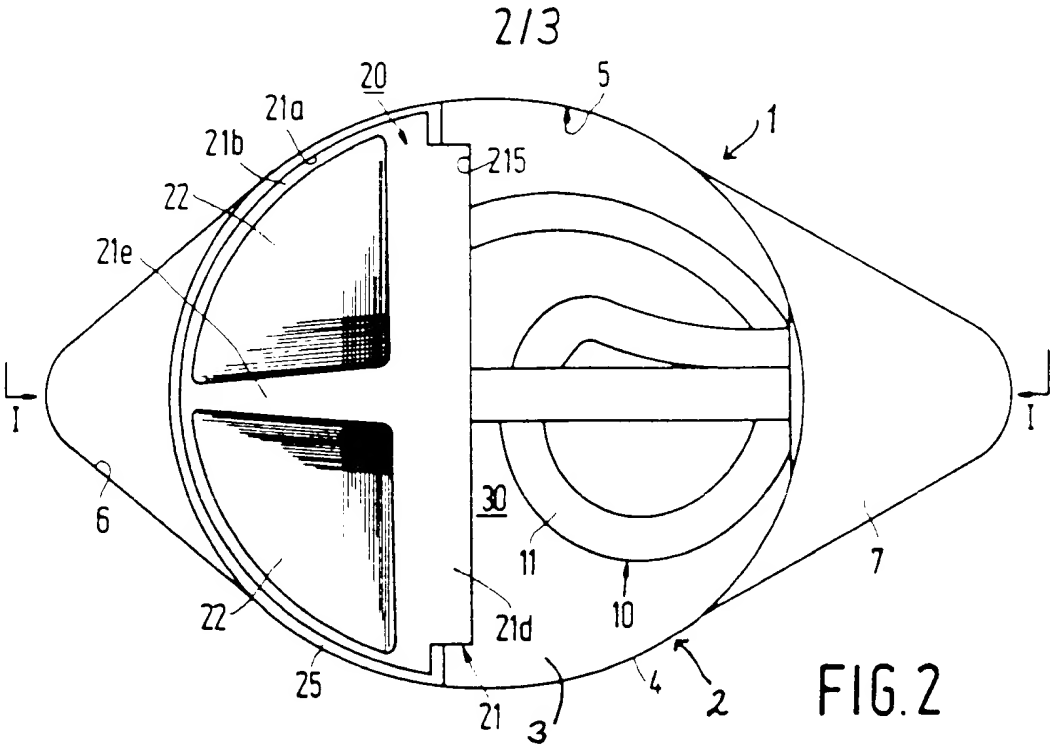

FIG.2

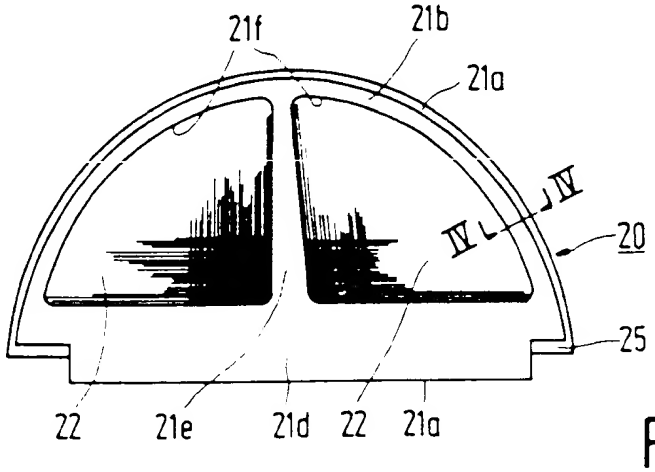

FIG.3

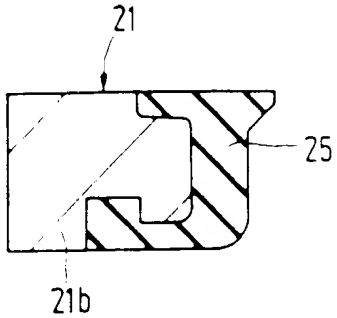

FIG.4

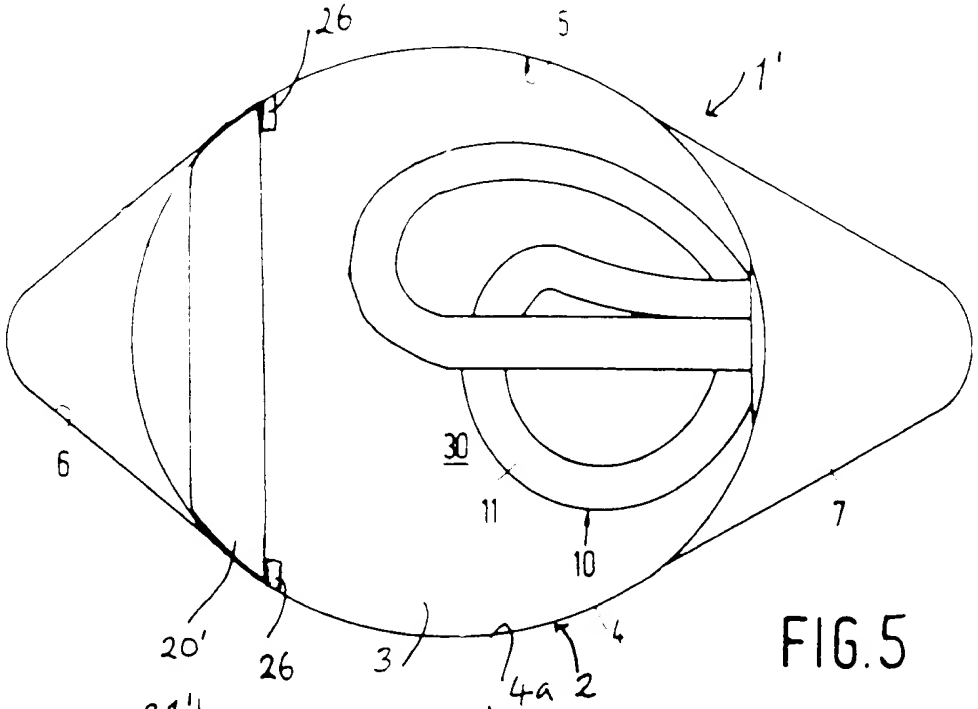

FIG.5

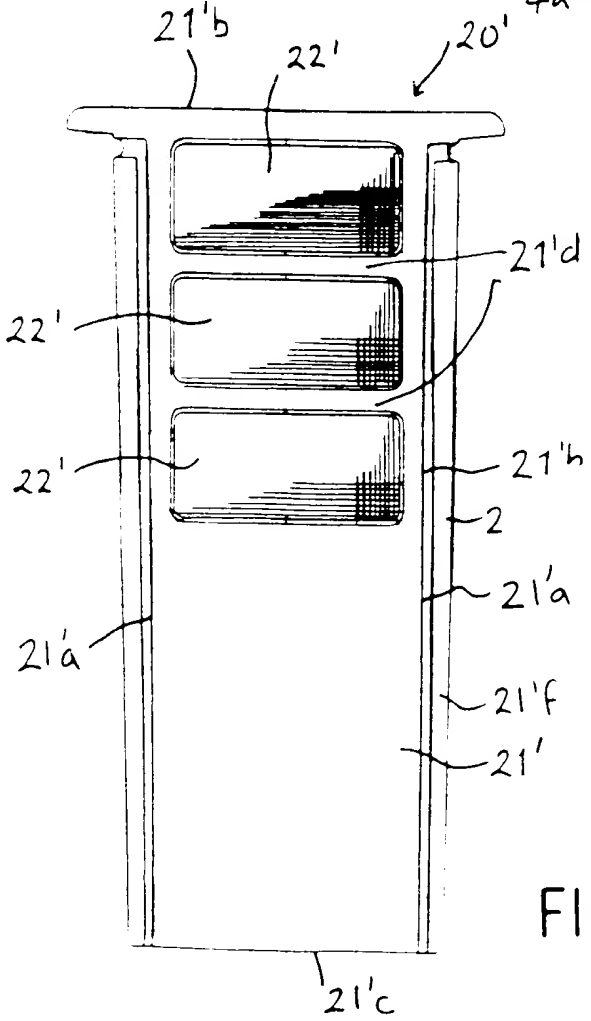

FIG.6

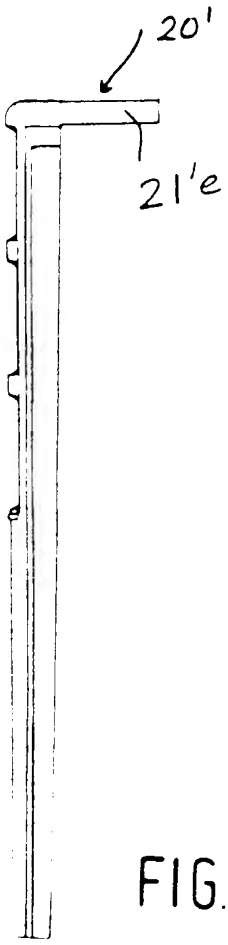

FIG.7

AN ELECTRICAL KETTLE

This invention relates to an electrical kettle comprising a hollow body having base and side walls defining a receptacle for liquid to be heated, the side wall of the receptacle having a spout for enabling liquid to be poured out of the receptacle, and electrical resistance heating means arranged at the bottom of the receptacle for heating liquid within the receptacle.

It is currently common for the body of such an electrical kettle to be formed of a heat-resistant plastics material. Thus, for example, GB-A-2179544 describes an electrical kettle in which the body may be injection-moulded from an acetal copolymer. The use of plastics materials as opposed to the conventionally used metals such as aluminium or stainless steel has advantages in that plastics materials are generally cheaper and are more readily formed into different shapes allowing for diversity in design of the kettle body.

Generally, such electrical kettles are used for boiling water to make tea, coffee or hot beverages. It is well known that in hard water areas a layer of scale (generally calcium carbonate) will build up on the interior surface and electrical heating element of the electrical resistance heating means of a conventional metal-bodied electric kettle. Provided that such scale is removed on a regular basis, this does not normally prove a problem to the operation of the kettle. It has been found that where the body of the kettle is formed of a plastics material scale will similarly build up on any metal components such as the heating element. However, the scale does not adhere to plastics materials and it has been found that in particularly hard water areas a scum develops on the surface of the water. This scum is unpleasant and unsightly and moreover may be poured out with the boiling water so that an oily or scum-like film may be formed on the surface of the cup or mug of tea or coffee being made with the water boiled by the kettle.

It is an aim of the present invention to provide an electrical kettle which enables the effects of such scum to be reduced.

According to the present invention, there is provided an electrical kettle comprising a hollow body having base and side walls defining a receptacle for liquid to be heated, the side wall of the receptacle having a spout for enabling liquid to be poured out of the receptacle, and electrical resistance heating means arranged at the bottom of the receptacle for heating liquid within the receptacle, characterised in that a filter comprising a filter mesh surface and supporting frame is removably mounted within the receptacle so that when heated liquid is being poured out of the receptacle through the spout the liquid passes through the filter so that sediment resulting from the heating of the liquid is prevented from passing out of the spout by the filter.

Thus, in an electrical kettle in accordance with the invention, a removably mounted filter is provided within the receptacle for filtering liquid poured out of the receptacle to ensure that any scum or similar undesired material such as particles of scale within the liquid heated within the receptacle remains within the receptacle.

The filter comprises a filter mesh supported by a frame removably mounted within the body of the kettle so as to enable removal of the filter to facilitate regular cleaning. Such a filter has a relatively simple construction, is easy to clean and is relatively cheap to manufacture. The frame of the filter may be provided with sealing means for forming a liquid-tight seal with the interior surface of the side wall of the body. The use of sealing means has the advantage of ensuring that no liquid and, more importantly, no scum or like material can bypass the filter. The interior surface of the side wall of the body may be provided with support members for supporting the frame of the filter means. This arrangement means that the filter is easily placed within and removed from the kettle body and that moreover where desired, for example in soft water areas, the kettle may be readily used without the filter. The filter frame may be supported within the receptacle so that the filter mesh extends transversely of the side

wall of the body. Such an arrangement has advantages over the situation where the filter frame is supported in a generally upright position closing the spout in that a more effective seal can be provided where the filter frame is arranged generally transversely of the kettle body. Moreover, the support means required where the filter extends transversely of the side wall of the kettle body is less complicated and easier to manufacture than those required where the filter extends in a generally upright position closing the spout.

The filter mesh may extend partially across the receptacle and be positioned directly beneath the spout. In addition, the filter mesh preferably slopes downwardly away from the spout with respect to the base of the body. This allows liquid and/or material remaining on the filter mesh to return to the receptacle when the kettle is stood upright upon its base after liquid has been poured out of the spout. It also allows the kettle to be filled relatively quickly via the spout regardless of the state of the filter mesh because liquid being poured into the kettle via the spout will flow down over the filter mesh into the receptacle, at the same time washing back into the kettle any loose material present on the filter mesh. The filter mesh may be a nylon mesh and may be a 50μm mesh.

Alternatively, the filter frame may be supported within the receptacle so that the filter mesh extends across the opening defined by the spout. This ensures that the opening defined by the spout is directly covered to inhibit leakage of water around the filter means.

Support members may be provided on the side walls so as to extend upwardly along the side walls from the base wall to support the filter frame such that the filter mesh extends across the opening defined by the spout. Such support members may be simply and easily formed with the kettle body.

The filter frame may be provided with resilient sealing sections which seal against the side walls of the hollow body. This ensures a good seal of the frame to the kettle body side wall

even if, for example, the kettle body expands slightly more than the filter frame during heating of water within the receptacle.

Embodiments of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a side view, shown partially in section along line I-I in Figure 2, of an electrical kettle in accordance with the invention;

Figure 2 is a top plan view of the electrical kettle shown in Figure 1 with a lid of the kettle removed to show one example of a filter means;

Figure 3 is a plan view of the filter means shown in Figure 2;

Figure 4 is a sectional view taken along line IV-IV in Figure 3 of part of the edge of a frame of the filter means shown in Figure 3;

Figure 5 is a top plan view of a modified version of the electrical kettle shown in Figure 1 with the lid removed to show another example of a filter means;

Figure 6 is a front view of the filter means shown in Figure 5; and

Figure 7 is a side view of the filter means shown in Figure 6.

It should of course be understood that the Figures are merely simplified schematic drawings and are not to scale.

Referring now to Figures 1 to 4 an electrical kettle 1 comprises a hollow body 2 having base 3 and side 4 walls defining a receptacle 5 for liquid to be heated, the side wall 4 having a spout 6 for enabling liquid to be poured out of the receptacle 5, and electrical resistance heating 10 means extending within the receptacle 5 for heating liquid within the receptacle 5. In accordance with the invention, filter means 20 are provided within the receptacle 5 so that liquid being poured out of the receptacle 5 through the spout 6 passes first through the filter means 20.

Thus, any liquid poured out of the receptacle 5 via the spout 6 must first pass through the filter means 20 which serves to remove any scum or similar undesired material, for example

particles of scale, from the liquid.

Turning now to the specific example shown in the Figures, the electrical kettle 1, as illustrated in Figure 1, is a so-called jug kettle. That is the kettle 1 has a plastics material body 2 having a side wall 4 which is much greater in height than the dimensions of the base wall 3. The body 2 may be formed by injection moulding from an acetal copolymer or polypropylene. The body 2 of the kettle has a handle 7 extending along the side wall 4 for enabling the kettle to be lifted to allow the receptacle 5 to be filled with liquid, generally water, and to allow heated liquid to be poured out of the receptacle 5 via the spout 6. A lid 8 formed of the same material as the body 2 is provided to close the open top of the body 2.

The electrical kettle 1 has a electrical heating means 10 extending within the receptacle 5 in the form of an electrical resistance heater or element 11 connected via an electrical control unit (not shown) providing the usual thermal cut-out, boil-dry and steam-responsive cut-out features to a mains power inlet plug 12, again of the usual type. The electrical resistance heater 11 may be of conventional type but could be a stainless steel heating element. The use of the latter has the advantage that, due to the fiercer boiling action resulting from the higher temperatures attained by the stainless steel element, less scale accumulates on the element 11. An on-off switch 13 may be provided on the handle 7. The body 2 of the kettle 1 may also be provided with a liquid level indicator 9 again of the conventional type.

It will of course be appreciated that the present invention may be applied to so-called conventional kettles, that is to kettles where the base is generally circular and has a diameter greater than the height of the side wall of the body and where the kettle handle extends across the lid of the kettle from the spout.

It should also be understood that the base wall 3, of the kettle body 2 shown in Figure 1 may have any desired shape and may be, for example, circular, oval, square or rectangular. Also, although the side wall 4 is generally cylindrical this need not

necessarily by the case and the side wall 4 may bow outwardly or inwardly.

As shown in Figures 1 and 2, filter means 20 are removably supported within the receptacle 5 defined by the body 2 of the kettle. In this example, the filter means 20 comprises a filter frame 21 supporting a substantially planar filter mesh 22 which may be formed of nylon and may comprise a 50μm (micrometre) mesh, that is a mesh with apertures or pores of 50μm diameter or width.

In the example illustrated in Figures 1 and 2, the filter means 20 is supported within the body 2 of the kettle by means of supporting projections 23 (which may be moulded integrally with the body 2) upon which the filter frame 21 rests. The filter frame 21 is in this example provided with corresponding projections 210 which in operation fit in front of the projections 23 to hold the frame 21 in place against the inner surface 4a of the side wall 4. This provides a very simple and cheap manner of support and moreover enables the filter means 20 easily to be removed for example for cleaning. Of course, other forms of support may be provided. For example, the filter frame 21 could be provided with projections which engage in recesses provided within the interior surface of the side wall 4.

As can be seen clearly from Figures 1 and 2, the filter mesh 22 supported by the filter frame 21 slopes downwardly, with respect to the base wall 3 of the kettle body 2, away from the spout 6. In addition, the filter means 20 extends only part way across the receptacle leaving a space 30 between a rear edge 215 of the filter frame 21 and the rear portion 4a of the inner surface of the body side wall 4. This allows liquid and/or material remaining on the filter mesh 22 to return to the receptacle 5 when the kettle 1 is stood upright upon its base wall 3 after liquid has been poured out of the spout 6. It also allows the kettle to be filled relatively quickly via the spout 6 regardless of the state of the filter mesh 22 because liquid being poured into the kettle via the spout 6 will flow down over the filter mesh 22 into the receptacle 5 at the same time washing back into the receptacle 5 any loose material on the

filter mesh 22.

Figures 3 and 4 illustrate in more detail the structure of the filter means 20 shown in Figures 1 and 2.

As shown most clearly by Figure 3, the filter frame 21 has a front frame portion 21b having an outer edge 21a which is shaped to conform to the shape of the interior surface 4a of the side wall 4. In this example, the front frame portion 21b is generally of an oval shape. A rear frame portion 21d defining the rear edge 215 extends between the edges of the front frame portion 21b and is generally rectilinear. A central support rib 21e extends between mid points of the front and rear portions 21b and 21d. The frame 21 thus defines two windows 21f each with the general shape of a quarter of a circle. The frame 21 supports the filter mesh 22 which extends completely across each window 21f. The frame 21 may be formed integrally by injection moulding from a plastics material, for example polypropylene, and may be formed in two halves between which the filter mesh 22 is sandwiched. Alternatively the filter frame 22 may be moulded about the filter mesh.

Sealing means 25 extend around the edge 21a of the front frame portion 21b. In this example, the sealing means comprises a resilient rubber seal, for example a silicone rubber seal, which interlocks with the shaped edges of the front portion 21b of the frame 21 in the manner shown in Figure 4. The sealing means 25 acts to seal the frame 21 to the inner surface 4a of the side wall of the kettle body 2 to ensure that liquid cannot pass out of the receptacle through the spout 6 by bypassing the filter means 20.

In operation of the kettle shown in Figures 1 and 2, the filter means 20 is fitted into the kettle by placing the filter means 20 into the kettle so that the frame 21 rests on the projection 23 and the projection 210 abuts the projection 23 to push the sealing means 25 against the inner surface 4a of the side wall 4 to provide a liquid-tight seal therewith.

The kettle may be filled with liquid, generally water, either via the spout 6 or by removing the lid 8. Where the kettle is

filled via the spout 6, the in-rushing water will flow through the filter mesh 22 so flushing any loose particles in the filter mesh 22 back into the receptacle 5 and also will flow along the downwardly inclined filter mesh 22 into the receptacle via the space 30. The filter means 20 thus should not hinder filling of the kettle.

Once the kettle has boiled, water is poured out of the spout 6 in the normal way. Water passing out of the spout 6 has to first pass through the filter mesh 22 which removes scale debris and also traps scum so avoiding or at least reducing the problems of oily or other unslightly surface films on cups of beverages which may otherwise arise where the water used is particularly hard.

The filter means 20 may be cleaned when the remainder of the kettle 1 is cleaned using conventional means to remove scale etc. In addition, in the example described above, the filter means may easily be removed for separate cleaning, for example by rinsing in clean water possibly with the addition of a scale remover such as acetic acid, if the need arises.

Although the filter means 20 has been shown supported so as to extend generally transversely of the side wall 4, filter means may alternatively be provided in an upright position indicated by the dashed line 40 in Figure 1. However, the transversely arranged filter means 20 shown in Figure 1 can provide a better seal to the inner surface 4a of the side wall and also is more easily supported than such an upright filter means. Also, the filter means may be supported other than by the side wall 4 of the body 2. Thus, for example, the filter means could be pivotably mounted by a support member to the under surface of the lid 8.

Although the filter means has been shown in Figures 1 to 4 as comprising a substantially planar mesh, this need not necessarily be the case. However, the use of a substantially planar mesh has the advantage of simplicity of manufacture and also allows loose debris to be readily washed off the surface of the mesh by the incoming water during filling of the kettle.

Figure 5 is a top plan view, with the lid removed, of a

modified version 1' of the electrical kettle shown in Figure 1.

The electrical kettle 1' is, in this example, the same as that shown in Figures 1 and 2 except for the filter means 20' and the manner in which the filter means 20' is mounted within the kettle body 2.

In this example, the filter means 20' is constructed and mounted within the kettle body 2 so that the filter mesh 22' extends generally vertically when the kettle is in an upright position. Thus, in this case the filter mesh 22' extends across the spout 6.

The filter means 20' has a generally rectangular plastics frame 21' having two long edges 21'a which, when the filter means 20' is correctly positioned within the kettle body 2, extend from the base wall 3 of the kettle body 2 along the length of the side wall 4 to end just below the rim 4a of the side wall 4. The filter means 20' thus extends throughout most of the depth of the receptacle 5 defined by the kettle body 2. The filter means 20' has a filter mesh 22' which is provided adjacent an upper one 21'b of the two shorter edges 21'b and 21'c of the frame 21' and which is divided by ribs 21'd extending transversely of the long edges 21'a into a number of separate sections, three in the example shown. The ribs 21'd act to support and strengthen both the filter mesh 22' and the frame 21' itself.

The upper short edge 21'b of the frame 21' is provided with a lip or shelf 21'e which projects transversely, as shown approximately perpendicularly, of the main portion of the frame 21' so as to point, in use of the filter means 20' as shown in Figure 5, away from the spout 6. The shelf 21'e serves to prevent water bypassing the filter mesh 22 when the water is being poured out of the receptacle 5.

The frame 21' has two further lips or sealing rims 21'f which extend along the long edges 21'a and like the shelf 21'e project transversely of the main body of the frame 21'. The sealing rims 21'f are connected to the main body of the frame 21' by weakened sections 21'h which may be formed as thinner plastics material

sections. The connection of the sealing sections 21'f to the edges 21'a by the weakened sections 21'h is somewhat resilient allowing the sealing sections 21'f to be bent in towards one another which, as will be more clear from the following description, enables a better seal to the side wall 4.

The frame 21' may be moulded in a single piece from a suitable plastics material such as a polypropylene. The filter mesh 22' may be a woven monofilament plastics material mesh with a mesh size of about 80μm. The plastics material forming the mesh may be, for example, nylon, polyester or polypropylene. The frame 21' is desirably moulded about the filter mesh 22' so that the filter mesh 22' is secured to the frame 21' during the moulding process.

The kettle body 2 is, as mentioned above with respect to Figures 1 and 2, formed by injection moulding on suitable plastics material. In the example illustrated by Figures 5 to 7, the kettle body 2 is moulded so as to provide two retaining ribs 26 extending along the inside of the side wall 4 from the base wall 3 up to a location close to the rim 4a of the side wall 4. The retaining ribs 26 serve to hold the filter means 20' in place.

The filter means 20' is push-fitted into the space between the spout and retaining ribs 26 in the kettle body 2. The respective dimensions of the frame 21' with its sealing sections 21'f and the interior of the kettle body are such that insertion of the filter frame 21' causes the sealing sections 21'f to be pushed slightly towards one another. This means that the sealing sections 21'f are forced tightly against the side wall 4 of the kettle body 2 so as to ensure a good seal between the side wall 4 and the filter means 20' so as to inhibit leakage of water around the edges 21'a of the filter means 20'. If desired a further retaining rib (not shown) may be provided on the base wall 3 so as to extend between the retaining ribs 26 so as to improve even further the sealing of the filter means 20' within the kettle body 2.

The kettle body 2 and the filter means 20' are formed of plastics materials which should have similar thermal expansion characteristics so that the seal between the sealing sections 21'f

and the side wall 4 is maintained even as the kettle body 2 heats up and then cools down during use of the kettle. The resilience of the sealing sections 21'f enables the filter means 20' to maintain a good seal to the kettle body even if there is a slight difference in the thermal expansion characteristics of the kettle body 2 and the filter means 20'.

Although the present invention is particularly advantageous where the kettle has a plastics material body 2 it may also be applied where the kettle has a metal body. Although metal bodied kettles are less likely to produce scum, the filter means could still serve to collect scale debris and may be of particular advantage where the nature of the local water is such as to produce particular scale which does not adhere or tends to flake off from the metal surfaces.

CLAIMS

1. An electrical kettle comprising a hollow body having base and side walls defining a receptacle for liquid to be heated, the side wall of the receptacle having a spout for enabling liquid to be poured out of the receptacle, and electrical resistance heating means arranged at the bottom of the receptacle for heating liquid within the receptacle, characterised in that a filter comprising a filter mesh surface and supporting frame is removably mounted within the receptacle so that when heated liquid is being poured out of the receptacle through the spout the liquid passes through the filter so that sediment resulting from the heating of the liquid is prevented from passing out of the spout by the filter.

2. An electrical kettle according to Claim 1, further characterised in that the frame of the filter is provided with sealing means for forming a liquid-tight seal with the interior surface of the side wall of the body.

3. An electrical kettle according to Claim 1 or 2, further characterised in that the interior surface of the side wall of the body is provided with support members for supporting the frame of the filter.

4. An electrical kettle according to Claim 1, 2 or 3, further characterised in that the filter frame is supported within the receptacle so that the filter mesh extends transversely of the side wall of the body.

5. An electrical kettle according to Claim 4, further characterised in that the filter mesh extends only partially across the receptacle and is positioned directly beneath the spout.

6. An electrical kettle according to Claim 5, further characterised in that the filter mesh slopes downwardly away from the spout with respect to the base of the body for allowing liquid and/or material remaining on the filter mesh to return to the receptacle when the kettle is stood upright upon its base after liquid has been poured out of the spout.

7. An electrical kettle according to any one of Claims 1 to 3, further characterised in that the filter frame is supported

within the receptacle so that the filter mesh extends across the opening defined by the spout.

8. An electrical kettle according to Claim 3, further characterised in that the support members extend upwardly along the side walls from the base wall to support the filter frame such that the filter mesh extends across the opening defined by the spout.

9. An electrical kettle according to any one of Claims 1 to 8, further characterised in that the filter frame is provided with resilient sealing sections which seal against the side wall of the hollow body.

10. An electrical kettle according to Claim 9, further characterised in that the sealing sections are connected to the remainder of the frame by weakened sections.

11. An electrical kettle substantially as hereinbefore described with reference to Figures 1 to 4 or Figures 5 to 7 of the accompanying drawings.